Title: Big Data Mining for Applied Energy Savings in Buildings

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Residential and commercial buildings in China, India, the United States (US), United Kingdom (UK), and Italy consume 39-45% of each nation's primary energy (approximately 73% of electricity). Building energy models can be used to automatically optimize the return-on-investment for retrofits to improve a building's energy efficiency. However, with an average of 3,000 building descriptors necessary to accurately simulate a single building, there is a market need to reduce the transaction cost for creating a simulatable model for every building in a city and calibrate the models to utility data prior to capital expenditures.

Oak Ridge National Laboratory has utilized two of the world's fastest supercomputers, assembled unique datasets, and developed innovative algorithms for big data mining to produce the Automatic detection and creation of Building Energy Models (AutoBEM) technology for urban-scale energy modeling. The project developed the world's most accurate method for determining building footprints from satellite imagery and the world's fastest building energy model generator. The team has also leveraged a total of eight supercomputers to analyze the best methods, metrics, and algorithms for calibrating building models to measured data within 4% of hourly electricity use; well beyond current industry standards necessary for private-sector financing. The project developed the world's fastest buildings simulator, over 8 million simulations totaling over 200TB, and mined this data with over 130,000 parallel artificial intelligence algorithmic instances to develop the world's best calibration algorithm in terms of accuracy, runtime, and robustness.

Biography

Dr. Joshua New completed his Ph.D. in Computer Science at the University of Tennessee, USA, in 2009. He is an R&D staff member of Oak Ridge National Laboratory and currently serves at ORNL's Building Technology Research Integration Center (BTRIC) as subprogram manager for

software tools and models. He has over 100 peer-reviewed publications and has led more than 45 competitively-awarded projects in the past 5 years involving websites, web services, databases, simulation development, visual analytics, supercomputing using the world's #1 fastest supercomputer and artificial intelligence for big data mining. He is an active member of IEEE and ASHRAE.